NAVAL METEOROLOGY AND OCEANOGRAPHY MINE WARFARE

PROVIDING AN ASYMMETRIC WARFIGHTING ADVANTAGE

Mine Warfare: Environmental conditions strongly impact mining and mine countermeasures operations. All aspects of mine warfare, from mine laying to mine hunting and mine sweeping operations are significantly affected by environmental conditions, especially in coastal regions where temporal and spatial variability of the environment are the greatest. Knowledge of the littoral battlespace is necessary for successful mission planning of mine warfare sensors and timely execution of tactics to support mining operations. The Naval Meteorology and Oceanography Command provides ongoing support for the Navy's Mine Warfare forces to neutralize threats and to allow for assured access of maritime assets in these strategic regions in interests.

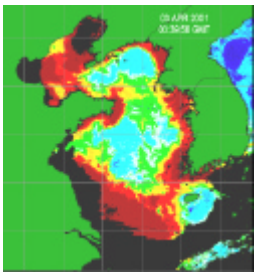
The Naval Oceanographic Office's (NAVOCEANO) bottom mapping and imaging information, oceanographic models, weather forecasts, warfare support teams and mine warfare environmental databases play a vital role in eliminating mine hazards. During Operation Iraqi Freedom environmental data collected from mine countermeasures vessels, survey ships, tactical aircraft, buoys and satellites were critical in developing realistic mine clearance timelines which expedited the clearance of waterways leading to Iraqi ports.

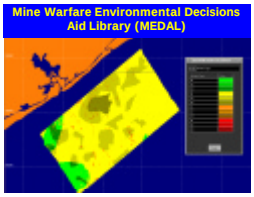
Mine Warfare efforts are a primary focus of the Meteorology and Oceanography Command. Key aspects of this command-wide focus are:

- **Oceanographic Expertise.** NAVOCEANO scientists are continually developing advanced methods to provide near real-time engagement to the warfighter. NAVOCEANO's scientific expertise, modeling and image analysis tools, on-scene participation and the computing power of the Major Shared Resource Center provide a major contribution to in-theater mine warfare planning and operations.
- **Mobile Mine Warfare Teams (MMTs).** Specially trained environmental teams from Oceanography community are deployed on vessels in-theater to provide analysis of the meteorological, oceanographic and geologic conditions in the battlespace. They also contribute weather forecasts, interpret bottom-mapping side scan sonar imagery, analyze water properties, bathymetry, tides and currents and provide timely and expert advice to Mine Warfare commanders on the optimization of mine warfare sensors and weapon systems.

Important Oceanographic contributions to Mine Warfare include:

- **Mine Warfare Environmental Decision Aids Library (MEDAL).** NAVOCEANO's databases are an integral component to the mine warfare tactical decision aid, MEDAL. These databases incorporate in-situ data from the battlespace with existing information to help mine warfare forces effectively plan and conduct operations.
- **Weather Forecasts.** Oceanography community personnel provide near real-time weather forecasts to assist mine warfare commanders determine mine countermeasure methods to employ and to provide early warning of severe weather that could affect the performance of Naval personnel and assets.
- **Bottom Mapping.** Oceanography personnel interpret acoustic imagery acquired from tactical units and Underwater Unmanned Vehicles (UUVs) in-theater and/or transmitted to NAVOCEANO where it is assimilated with historic data to provide near real-time description of the seafloor, including seafloor characteristics, water depths, and image mosaics of the seafloor. These data assist mine warfare units determine mine clearance rates and distinguish between mines, other man-made objects and natural features.
- **Tides, Currents, Optics and Salinity.** Oceanographic experts from the MMTs supply warfighters with accurate tidal, current and salinity data during mine countermeasure operations. This information is crucial in determining deployment windows for UUVs, man/mammal diving operations and for determining sensor performance.





For more information: CNMOC Public Affairs, 228-688-4188 or pao@cnmoc.navy.mil.

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